

Fire and Maneuver in the Cyberspace Domain

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The armored brigade combat team (ABCT) is the most lethal formation the world has ever seen; no other force can match the firepower and maneuverability an ABCT can bring to bear on the decisive-action battlefield. However, where our adversaries lack in attributes inherent to an ABCT, they are gaining the edge in areas that include cyber, signals intelligence (SIGINT) and electronic warfare (EW).

With that in mind, a dynamic strike by our adversaries to our communications and intelligence systems, digital and frequency modulation (FM), can be a catastrophic blow to ABCT operations. Protecting our communications, exploiting those of our adversaries and supplying maneuver commanders with real-time and actionable intelligence will determine the difference between victory and defeat.

Army EW and tactical SIGINT are progressing through significant updates and restructuring in an effort to meet

this threat. In the past, troop and company commanders had been assigned Prophet (a 24-hour, all-weather, near-real-time, ground-based, tactical SIGINT/EW capability organic to the BCT) and EW teams that, due to lack of necessity, planning or understanding, had been a shackle rather than an enabler to their operations. The Army had all but abandoned EW in 1993 after the end of the Cold War. During the height of counterinsurgency (COIN) operations in 2009, the EW branch was finally reinstated for counter-improvised-explosive-device jamming. The only contact many maneuver leaders had with EW during that time was with the bulky “dukes” that sat in the back of our vehicles.

Current global events have shown an emergence of both state and non-state actors who are not only capable of waging war on land but also of competing in the electromagnetic spectrum (EMS). To meet these new and complex threats, the Army is rapidly replicating the same environments to test leaders at the combat-training centers. Every echelon of our Army

must be ready to meet the rapidly changing world and be confident in their ability to “fire and maneuver” in the EMS.

‘A way’ to compete in EMS

During the past year, the Ironhorse ABCT of 1st Cavalry Division has recalled forgotten skills of the pre-Gulf War years, including a platoon called combat EW and intelligence (CEWI). CEWI was once one answer to competing in and gaining an advantage in the EMS of the Cold War. Some in the SIGINT and EW circles will tell you the two capabilities are like oil and water. Ironhorse views the two as sides of the same coin called information.

Information is the medium that links the purpose and direction of leaders to maximize the warfighting functions’ capabilities. Information is a living environment, and it needs to be analyzed much the same way as the physical one we are used to maneuvering in. There is key terrain in this environment such as radios and computer systems, as well as obstacles and avenues of approach that allow or prohibit access into the network. By fully accessing the information landscape, maneuver units can find new ways to exploit our adversaries to mass and concentrate “informational fires.”

To gain the edge in the information battlefield and show that EW and SIGINT are better together than apart, Ironhorse founded the “Wild Bill” CEWI platoon to be a true organic fire-and-maneuver unit in the cyberspace domain. Since its inception, Wild Bill has sensed, collected, found, jammed, destroyed and disrupted enemy information networks in tough and realistic environments. The line of effort that Wild Bill has created is now tied to cyber-electromagnetic activities (CEMA), which is in turn tied to the intelligence section (S-2) collection assets. This chain of information will leave our adversaries exposed and helpless in the






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Figure 1. Current manning.

EMS. Wild Bill is not a one-size-fits all solution to mastering the cyberspace domain, but it does provide Ironhorse the ability to shape it.

Creating Wild Bill

Wild Bill was not created overnight, nor is it complete. The platoon has grown through trial and error during complex training events. It was decided early that Wild Bill would primarily serve as the electronic reconnaissance platoon and the commander's eyes and ears in the EMS. It was tasked with sensing and direction-finding (DF)

enemy communications, answering priority intelligence requirements (PIR) and, when able, destroying or degrading enemy emitters with either lethal or non-lethal fires.

An experienced infantry lieutenant was chosen and instructed to lead, equip and train the organization. Wild Bill was provided a Bradley Fires-Support Team (BFIST) Fighting Vehicle to allow the platoon to rapidly prosecute unobserved fire missions. This distinct inclusion is what makes the Ironhorse CEWI platoon different from other EW or CEWI platoons of the past. It is

organically able of gathering targeting information from its sensors, rapidly clearing ground and digitally processing fire missions. The fires section makes Wild Bill a true fire-and-maneuver element rather than a simple collection asset.

To cover the electronics side of the formation, Ironhorse funneled all available military-occupation specialty (MOS) 17Es (EW specialists) and MOS 35P/Ns (cryptologic linguists/SIGINT analysts) to fill the ranks. These troopers operate host EW and SIGINT systems ranging from legacy and

Mission: Integrate and synchronize EW and SIGINT capabilities to maximize intelligence collection and enable the targeting of enemy emitters.	
Name	Number
34-CO-3004	Conduct SIGINT collection
34-TM-0700	Conduct voice communications intercept or radio DF at a collection site
34-TM-0701	Conduct voice communications intercept during movement
34-TM-0702	Process incoming SIGINT information
34-TM-0713	Conduct a SIGINT survey
34-TM-0724	Coordinate in determining tactical SIGINT taskings
34-TM-0800	Establish an ES collection site
34-TM-0820	Manage Prophet sensor missions
13-CO-2019	Conduct EW
13-TE-2012	Conduct EA
13-TE-2013	Conduct electronic protection
13-TE-2014	Provide EW support (ES)
13-TE-6019	Establish an EW site
07-PLT-1342	Conduct tactical movement – platoon
07-PLT-3036	Integrate indirect-fire support – platoon
06-SEC-5086	Observe friendly indirect fires

Table 1. Wild Bill METL.

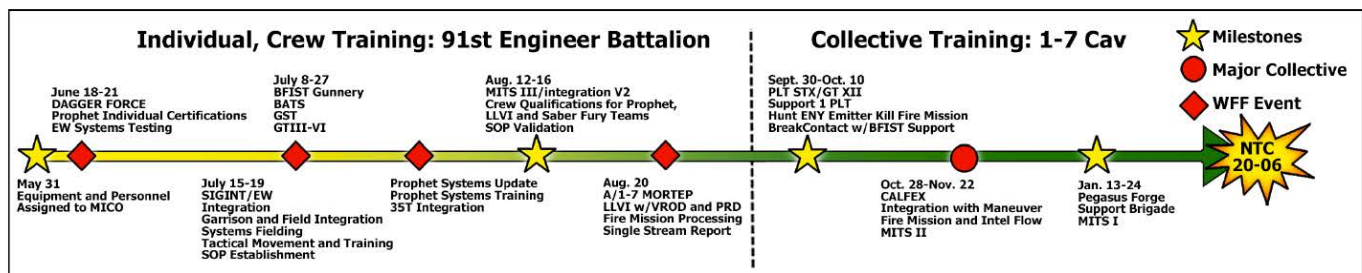


Figure 2. Training glidepath.

developing Army technologies to commercial-off-the-shelf (COTS) systems. The current arsenal includes Prophet, Sabre Fury (a modified version of the Duke V4/V5 EW system), EW Tactical Vehicle (EWTV), Versatile Radio Observation and Direction (VROD) system and the Herrick Pack. With the combination of systems and personnel from EW and SIGINT, the platoon also needs to delineate the legal and specialty differences between its troopers and equipment.

Wild Bill was initially assigned to the Ironhorse Military Intelligence Company, where a dedicated and informed SIGINT technician provided oversight and ensured the platoon remained in compliance with National Security Agency directives and procedures.

With an organizational structure and equipment assigned, Wild Bill's next task was to establish a modified table of organization and equipment (MTOE) and mission-essential task list (METL) to carry its troopers through individual, section and platoon training to meet their unique task and purpose. While training with a common understanding and nested purpose, the EW and SIGINT troopers began to integrate. Before long they were able to sense, find and report as a single unit.

The platoon applied these skills during the Wild Bill Gunnery Table XII platoon live-fire exercise and added the ability to shoot, move, communicate and accurately call for indirect fire. Following successful completion of their platoon-level gates, Ironhorse felt confident that Wild Bill could operate on the forward-line-of-own-troops (FLOT) and enable maneuver, intelligence and targeting.

Integrating Wild Bill with ABCT operations

With the concept proofed, Wild Bill was ready to operate with maneuver units, but it was not yet fully understood how much the platoon could provide to commanders and the brigade. Due to its nature as electronic reconnaissance, Wild Bill was naturally attached to support the Ironhorse Reconnaissance Squadron, 1-7 Cav. Therefore, Wild Bill was tested during both the Ironhorse company-level combined-arms live-fire exercise

(CALFEX) operations and the brigade-level home-station decisive-action validation, Pegasus Forge V. During these complex operations, Wild Bill troopers revealed their unique capabilities and limitations as they were tasked to find, fix and destroy multiple emitters in the form of live and static opposing forces (OPFORs).

The Wild Bill leadership assisted maneuver commanders in planning during the orders process and during execution. The platoon semi-independently operated no more than one phase line behind the FLOT. The mission during these exercises was to provide the maneuver units with overwatch as they executed combat tasks; relay important combat information; and ultimately enable targeting and intelligence for leaders at echelon.

During the training events, the platoon proved its ability to integrate with maneuver units while also revealing its unique capabilities and limitations.

Wild Bill's main combat multiplier is its ability to conduct electronic-support (ES) operations, namely DF. Though this ability is limited on the move, when established in tactically and technically sound collection sites (hasty or deliberate) the platoon is able to sense, fix and destroy the enemy with speed and accuracy. Conducting CEWI requires understanding of how sensors receive signals from the EMS and how each sensor can mutually support the others through proper geometry. Much like an ambush, there are different formations that can be used to achieve the greatest geometry for an electromagnetic

kill zone. In general, a concave shape yields the greatest chance to fix a target, while a linear or convex shape yields a greater area to detect but limits the chance to establish a fix.

With a proper collection site set, the sensors of Wild Bill received specific EMS bands to observe known as "spectrum sectors of fire." These sectors of fire were prepared in advance and coincided with the enemy electronic order of battle the S-2 prepares that lays out both the enemy equipment and frequency sets that may appear to Wild Bill operators.

Once an enemy emitter is detected, the operator develops the echelon, potential location and activity of the source. Throughout six weeks of CALFEX iterations, Wild Bill sensed more than 50 emitters. These emitters are a combination of OPFOR push-to-talk radios and Stratomists. The Stratomist is a signal emitter that is capable of replicating a myriad of single-channel plain text (SC/PT) and frequency-agile (such as frequency hop) communications. Also sensed and reported were helicopter navigation systems and dozens of other "out of play" frequencies.

Active emitters present a general azimuth to their location, known as a line of bearing (LoB). Just like a resection in land navigation, multiple LoBs from multiple sensors will achieve a cut or a triangulated fix on an emitter. These cuts and fixes are then reported and actioned by the platoon or other echelons. Wild Bill developed a reporting scheme that allowed free passage of both time-sensitive combat intelligence and detailed intelligence that directly supported targeting. Many

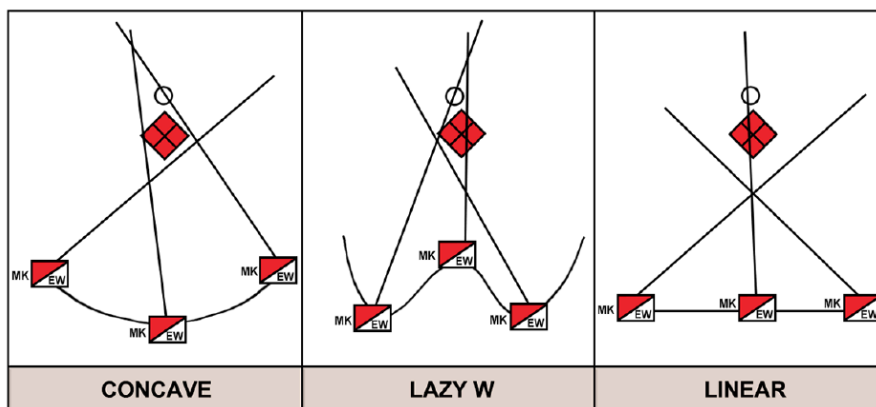


Figure 3. Collection-site formations.

Wild Bill SALT report	
Explanation	Example
<p>S: Enemy size</p> <p>A: Activities of enemy reported by sensors. Frequency of enemy mission.</p> <p>L: 8-digit grid or high-confidence LoB to specific named area of interest (NAI)/key terrain.</p> <p>T: date-time group (local).</p> <p>PIR: PIR answered.</p> <p>WB: Actions taken by Wild Bill Platoon.</p> <ol style="list-style-type: none"> Call for fire Electronic attack UAS Maneuver-unit assistance Continue to observe 	<p>S: Enemy observation post.</p> <p>A: Observing downed vehicle, preparing to call chemical munitions. Frequency ###.###. 10 watts.</p> <p>L: PV 1234 5678.</p> <p>T: 1525L.</p> <p>PIR: #5, enemy preparing to use chemical munitions in NAI 1.</p> <p>WB: a – battalion mortars.</p>

Table 2. SALT report.



Figure 4. An M-ATV Prophet established in a collection site.

found emitters answered PIRs such as the location of high-value targets; chemical, biological, radioactive, nuclear and high-yield explosives targeting (commonly known as CBRNE); and obstacles.

Once the maneuver commander had this intel in hand, Wild Bill’s troopers would action their modified size, activity, location, time (SALT) report, which detailed the information gathered and the way-ahead to leaders at echelon.

Fires: lethal and non-lethal

Wild Bill is free to prosecute the emitters with the lethal and non-lethal means available to it. Out of more than 15 digitally processed fire missions (both live and simulated), only one landed more than 100 meters from the target. Wild Bill even sensed and destroyed a live emitter with 120mm mortars from more than two kilometers away. While not as accurate as observed fires, Wild Bill was still able to achieve effects on the enemy and disrupt their operations.

Also available to Wild Bill is its non-lethal fires asset, electronic attack (EA). EA, “jamming,” against an adversary’s communications comes with an inherent risk to the jammer because of its EMS signature; essentially, it becomes like a flashlight in the dark to enemy sensors. Wild Bill had limited practice jamming, but when it did go “buzzer on,” it achieved effects on Stratomist and live targets during the CALFEX.

Due to the risk to the force, Ironhorse uses this capability deliberately and in conjunction with other CEMA effects at a decisive point. Stacking effects like these on top of one another creates an electromagnetic dilemma. During one portion of Exercise Pegasus Forge, after the enemy tactical-operations center was destroyed, Wild Bill conducted EA against enemy FM communications, furthering the OPFOR’s confusion and achieving dominance in the EMS.

Capabilities and limitations

Wild Bill has carved a niche for itself by being able to search, find and destroy emitters in parts of the EMS. Overall, the platoon can see almost every signal in the very-high-frequency and ultra-high-frequency ranges. Within these frequency ranges, Wild Bill is very capable of searching, finding and destroying SC/PT emitters at ranges up to 10 kilometers. With more

open terrain than the Fort Hood Training Area, it is expected that the platoon can see and affect results much further.

For signals that Wild Bill is unable to prosecute directly, it has been able to “tip” to more Ironhorse assets such as the Shadow unmanned-aerial-systems (UAS) platoon or the brigade intelligence-support element. Wild Bill’s greatest strength is its ability to use these skills while operating on the FLOT. Unlike other EW and CEWI platoons, Wild Bill can conduct CEWI that directly enables maneuver, intelligence and targeting.

However, Wild Bill still remains limited in its ability to find and fix frequency agile communications, Joint Capabilities Release’s (JCR) signatures and emitters in the super-high-frequency range. While Wild Bill and its assets are not wholly at fault, it should be noted that their Darkhorse and foreign-adversary counterparts can do this with lethal accuracy.

Jamming communications is as much a capability as it is a limitation because it is largely untested at the BCT level. As stated, it comes with a risk to the force that would need to be mitigated. Wild Bill will strive to find innovative ways around these complicated problems because its troopers understand that the lives of all Ironhorse troopers could depend on their ability to see and shoot first in EMS.

Improving Wild Bill

As stated, Wild Bill is not a complete product yet, and Ironhorse will continue to seek upgrades to its equipment, manning and vehicles to give it the edge in the electromagnetic and on the real-world battlefield. The current arsenal of sensing and jamming equipment is plagued with three major issues that need to be addressed if other CEWI or EW platoons are to be successful.

The first issue is the antennas attached to the Wild Bill sensors. The sensors housed in Wild Bill are some of the best available to any BCT. However, the antennas lack the sensitivity to detect emitters at ranges necessary to support large-scale combat operations (LSCO). An ABCT like Ironhorse is capable of affecting up to 30



Figure 5. A BFIST provides security for the EWTV.

kilometers with both organic and attached fires assets, and it has a line-of-sight of 20 kilometers with a BFIST’s Fire-Support Sensor System A3. With more sensitive antennas and systems, Wild Bill will be able to sense enemy reconnaissance and main-body elements up to 30 kilometers and to provide early warning before the enemy moves into line-of-sight.

The second issue is the limited jamming capability of the jammers Wild Bill has at its disposal. The EWTV and Saber Fury jammers are the very same bulky dukes used during COIN that were not meant to defeat near-peer communications. Fielding new equipment with more sensitive receivers and stronger power outputs will be crucial in providing BCTs with a reliable system.

The third issue is the lack of a common graphical user interface (GUI). The multiple Wild Bill sensors do not have the ability to digitally share found frequencies, LoBs or enemy intelligence. To do this, operators must use another method, FM or JCR, to share information and fix the emitter with a map and protractor. With a common GUI

and a meshed network, operators can put the protractors aside and more accurately fix a hostile emitter. Wild Bill and CEMA have access to the EW Planning-Management Tool (EWPMT), which is capable of linking the Defense Digital Service and sharing information with other battle-command common-services systems. However, many of the Wild Bill sensors use COTS systems that are not compatible with EWPMT. To be successful with future equipment fielding, the Army must adopt a common planning tool and GUI for all equipment before becoming a program of record.

As maneuver begins to adapt EW and SIGINT, EW and SIGINT must adapt to maneuver. The current platforms that Wild Bill is assigned – mine-resistant ambush-protected (MRAP) all-terrain vehicles and MaxxPro MRAPs – are not capable of maintaining the rapid and forceful nature of an ABCT. CEWI platoons of the future need to reflect the mobility of the unit they support, and in the case of Ironhorse, they will need tracks.

As it stands now, Wild Bill is 18 troopers strong, with only 14 of them EW or

SIGINT MOSs. Combine that with the dozen sensors and five vehicles they operate, and one can picture the physical problems that can arise while operating in a contested and continuous-operations environment. Updating the modified table of organization and equipment to task-organize cavalry-scout Bradley Fighting Vehicles and crews will allow the platoon to be self-sufficient at both security and maneuver while also operating continuously. These vehicles, both Bradley and Armored Multi-Purpose Vehicle variants, will need to be outfitted with EW and SIGINT equipment and systems to ensure that CEWI remains fully mission-capable.

Answer to dilemma

Platoons like Wild Bill are combat multipliers, shaping efforts within the cyberspace domain. As with any other shaping operation, their task and purpose must be nested to support the main effort. This begins with planning, in depth and in advance.

Wild Bill cannot be the only EW and SIGINT asset out there. By stacking the knowledge and effects that CEMA and the S-2 can bring to bear, we can undoubtedly create an inescapable electromagnetic dilemma for our adversaries. For example, an ABCT can better ensure the success of a combined-arms breach or the seizure of a city if it is able to simultaneously deny enemy air-defense artillery with an EA-18G Growler (jamming-capable aircraft), deny FM signals with an EC-130H Compass call, deny JCR with a cyberattack, and deny recon or third-party communications with Wild Bill.

If a BCT like Ironhorse is the primary battlespace owner in an LSCO environment, it must also extend its influence throughout the cyberspace domain on a scale greater than Wild Bill. Ironhorse foresees the creation of an entire EW company to better shape cyberspace at the BCT level. Under the command of a cyber and EW officer (Functional Area 17B), this company will be tasked to conduct information dominance within its brigade's area of operations (AO). Its primary tasks would include mapping the electromagnetic environment, locating key command-and-control (C2) nodes and denying, degrading or deceiving



Figure 6. VROD mounted on the Wild Bill BFIST in a collection site.






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Figure 7. "A way" to update Wild Bill.

enemy tactical-information systems. The company would be fully nested with CEMA and the S-2 to accomplish cyberspace echelons of fire that are desperately needed in the decisive-action environments of the future.

Accomplishing these tasks would require expansion of the current CEWI structure into three platoons as well as more capabilities task-organized to the company. The primary ES platoon would operate in tandem with a SIGINT section much like the current

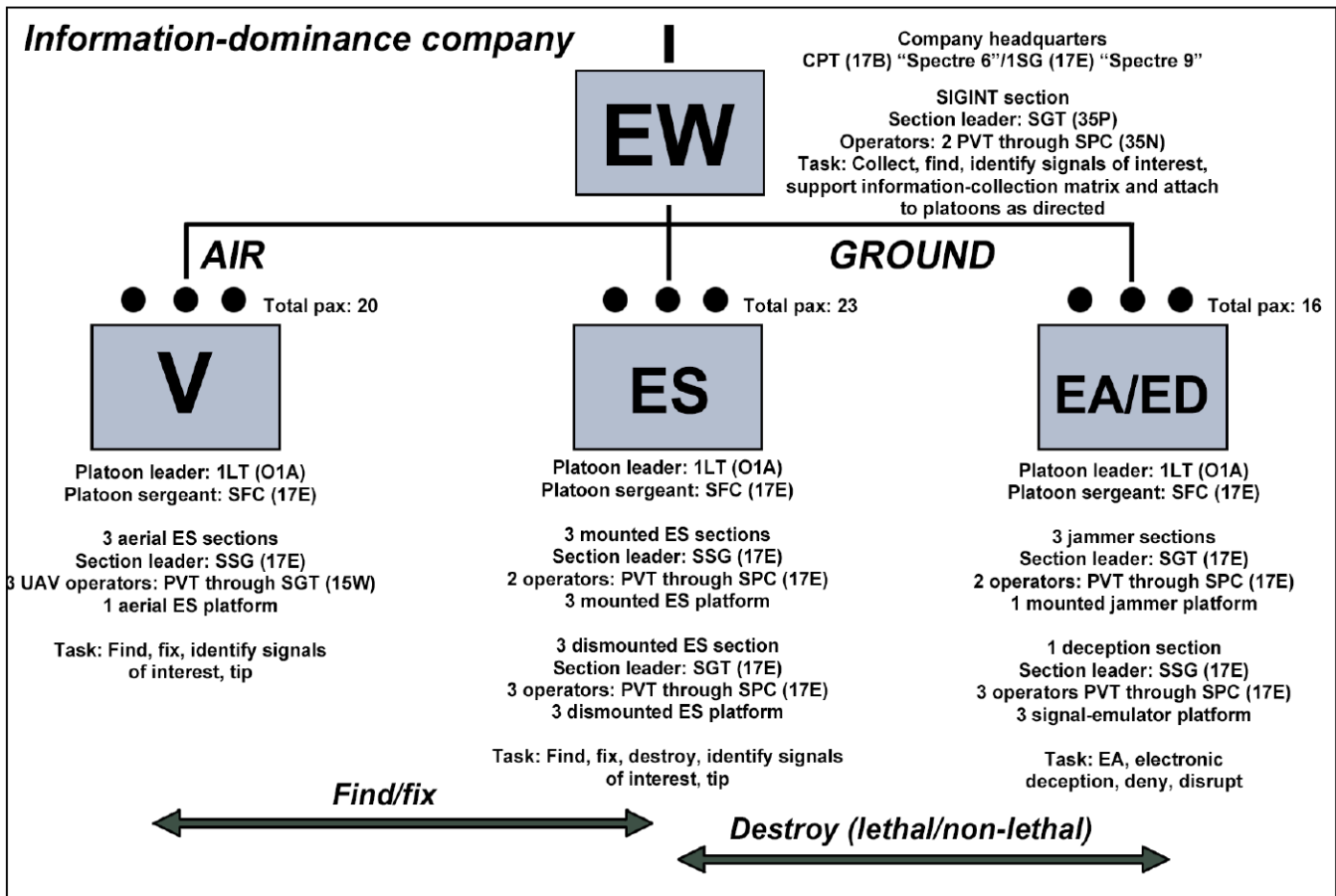


Figure 8. Projected information-dominance company.

Wild Bill structure. It would be tasked to conduct ES to find, fix and destroy enemy emitters and C2 nodes through DF. The second platoon would focus on conducting EA to degrade and deceive enemy information systems. Finally, the third platoon would conduct ES with organic unmanned aerial vehicles (UAV) armed with EMS sensors.

The two ground platoons can be fielded by acquiring more program-of-record systems to the BCTs, with the addition of more EW personnel who are projected in the current force-design update. The third aviation platoon will require fielding an ES-capable UAV platform and more operators. Fielding this third platoon would be decisive in shaping the cyberspace domain within a BCT's AO. This platoon will allow the sensors to get above terrain and see the EMS past the close fight and into the deep zone.

The late LTG Hal Moore said, "There is always one more thing you can do to increase your odds of success"; the Ironhorse ABCT is investing time and

energy into one of those things. The progress accomplished in the Ironhorse ABCT is a step in the right direction toward competing in an increasingly disconnected, intermittent and limited environment. With initiatives like the Wild Bill CEWI platoon, Ironhorse will continue to fire and maneuver in the cyberspace domain.

COL Michael Schoenfeldt commands 1st ABCT "Ironhorse," 1st Cavalry Division, Fort Hood, TX. His previous assignments include commander, 2nd Battalion, 5th Cavalry Regiment, 1st ABCT, 1st Cav Division; commanding general's executive officer, 1st Cav Division; squadron executive officer, 1st BCT, 4th Infantry Division, Fort Carson, CO; and secretary general staff, 4th Infantry Division. COL Schoenfeldt's military schools include the Eisenhower School (Fort Lesley J. McNair), intermediate-level education, Armor Maneuver Captain's Career Course and the Armor Basic Officer Leader Course. He holds a bachelor's of arts degree in history from the University of Kansas, a master's of arts degree in adult

education from Kansas State University and a master's of arts degree in national security strategy and resourcing, with a concentration in supply-chain management, from the Eisenhower School. COL Schoenfeldt's awards include the Bronze Star Medal and Meritorious Service Medal. He also earned a Combat Action Badge.

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CPT Bill Malcolm is the Wild Bill CEWI platoon leader, 1st ABCT "Ironhorse," 1st Cavalry Division. His previous assignments include scout-platoon leader, 2-5 Cav, 1st ABCT, 1st Cav Division;

platoon leader, Company A, 2-5 Cav, 1st ABCT "Ironhorse," 1st Cav Division; and plans officer, 2-5 Cav, 1st ABCT "Ironhorse." CPT Malcolm's military schools include University of Connecticut Army Reserve Officer Training Corps (distinguished military graduate), Infantry Basic Officer Leader

Course, Ranger School, Airborne School and the Bradley Leader Course. He has a bachelor's of arts degree in history with a concentration in American studies from Eastern Connecticut State University. CPT Malcolm also earned an Expert Infantryman Badge, Ranger Tab and Parachutist Badge.

For more information

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Figure 9. The EWTV takes the high ground.

ACRONYM QUICK-SCAN

ABCT – armored brigade combat team
AO – area of operations
ATCAE – Army Technical Control and Analysis Element
BCT – brigade combat team
BFIST – Bradley Fires Support Team Fighting Vehicle
C2 – command and control
CALFEX – combined-arms live-fire exercise
CEMA – cyber-electromagnetic activities
CEWI – combat electronic warfare and intelligence
COIN – counterinsurgency
COTS – commercial-off-the-shelf
DF – direction-finding
EA – electronic attack
EMS – electromagnetic spectrum
ES – electronic support
EW – electronic warfare
EWPMT – Electronic Warfare Planning Management Tool
EWTV – Electronic Warfare Tactical Vehicle
FLOT – forward-line-of-own-troops
FM – frequency modulation
FM – field manual
GUI – graphical user interface
JCR – Joint Capabilities Release
LoB – line of bearing
LSCO – large-scale combat operations
METL – mission-essential task list
MOS – military-occupation specialty
MRAP – mine-resistant ambush-protected
MTOE – modified table of organization and equipment
NAI – named area of interest
OPFOR – opposing force
PIR – priority intelligence requirement
SALT – size, activity, location, time
SC/PT – single-channel plain text
SIGINT – signals intelligence
UAS – unmanned aerial system
UAV – unmanned aerial vehicle
VROD – Versatile Radio Observation and Direction (system)